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# Appendix B – Supplemental Traffic Report



## Introduction

The Federal Street Multimodal Connector Project, proposed by the City of St. Albans, Vermont, would reconstruct the Federal Street Corridor to improve its use by automobiles, trucks, pedestrians, bicyclists, and public transit. Currently, US Route 7 (North and South Main Street) bisects the City's downtown which results in heavy north-south passenger and commercial traffic and congestion that detracts from the downtown human environment. The proposed Federal Street Multimodal Connector is intended to provide a parallel urban collector route to divert through and truck traffic from the City's downtown and create an alternative access to Interstate 89 (I-89).

An Environmental Assessment (EA), dated May 2012, was prepared to describe and assess the environmental consequences that may result from the proposed Federal Street Multimodal Connector (i.e., "the Project" or "the Proposed Action"). This traffic report has been prepared to supplement the information provided in the EA and focuses on documenting traffic operational comparisons between the "No Action" and "Proposed Action" alternatives. The EA should be consulted for more detailed information about the Project. The analyses presented herein have been prepared in conformance with guidelines and standards of the Vermont Agency of Transportation (VTrans). A description of the Project and the Study Area for the traffic operations assessment are presented below.

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### Project Description

The Project, also referred to as the Proposed Action, encompasses the Federal Street Corridor. The Federal Street Corridor, currently functioning as the informal bypass for Main Street traffic through the City of St. Albans, includes a mix of residential, commercial, and industrial land uses. The Federal Street Corridor has inherent problems and, in its current configuration, it is inadequate to effectively serve as a bypass. Other north-south routes through the City are limited by terrain, land use or lack of connection to the downtown, the railroad and the commercial industrial zones to be considered viable alternatives to the Federal Street Corridor.

The Project creates an attractive and effective alternative bypass route of Main Street. For description purposes, the Project has been broken into five segments as follows:



- Proposed Nason Street Connector (South Main Street to Nason Street);
- Lemnah Drive and Allen Street (Nason Street to Stowell Street);
- Allen / Catherine / Federal Street Segment (Stowell Street to Kingman Street);
- Federal Street (Kingman Street to Lower Newton Street); and
- Lower Newton Street (Federal Street to North Main Street).

These five segments total approximately 2.1 miles and are depicted in **Figure 1**. The existing condition of each segment is described in detail in Chapter 2. With the exception of Lemnah Drive, all of the existing Federal Street Corridor segments are classified as urban collectors. With the completion of this Project it is anticipated that a single urban collector functional classification would apply to the entire corridor. The typical roadway section for the Project corridor includes the following elements:

- 11-foot wide travel lanes for each direction of vehicular traffic;
- 4-foot wide (min.) bicycle lanes (5-foot wide where on-street parking is provided);
- 2 to 4-foot wide grass utility strips; and
- 5-foot wide sidewalk (on both sides of the road along Federal Street, on one side elsewhere).

Depending on the age and condition of the road surface and the need to repair or relocate buried utilities, full depth reconstruction may be required. In areas where recent roadwork has been performed, road surface rehabilitation may be possible. Street trees would be planted in the grass utility strip where appropriate, and energy efficient street lights would also be provided. Access management improvements such as driveway formalization and consolidation would be implemented, and traffic and wayfinding signage would be added and improved as appropriate.

The Nason Street Connector is a proposed new two-lane roadway that would extend the Interstate Access Road westerly past South Main Street across City-owned property to the intersection of Lemnah Drive and Nason Street. Improvements along the proposed Nason Street Connector would include bicycle lanes on both sides of the street, a sidewalk on the north side of the road and dedicated right turning lane at the intersection with South Main Street. The intersection would become signalized, with the addition of left turn lanes on South Main Street. All pedestrian crossings within the signalized intersection would be marked and properly signed, and controlled by pedestrian signals.

In addition to the corridor-wide improvements, the Project includes improvements at existing intersections. Reconstruction of the Lower Welden Street / Allen Street / Lemnah Drive intersection includes installation of a roundabout. The Proposed Action at the Lake Street / Catherine Street / Federal Street intersection is a signalized intersection with Catherine Street and Market Street converted to one-way

legs of the intersection. The signalized improvement includes pedestrian accommodations.

## Study Area

The study area for traffic operational assessment encompasses the roadway network generally bound by: Lower Newton Street from North Main Street to Federal Street to the north; Federal, Market, and Allen Streets, and Lemnah Drive to the west; Nason Street to south; and US Route 7 (North and South Main Street) from Upper and Lower Newton Streets to the Interstate Access Road to the east. For traffic operations evaluation purposes, the following intersections were included in the traffic analysis model:

- US Route 7 (North Main Street) at Upper Newton/Lower Newton Street
- Lower Newton Street at Federal Street
- Lake Street at Federal Street/Catherine Street
- Lake Street at Market Street
- Catherine Street/Allen Street at Stebbins Street/Market Street
- Lower Welden Street at Allen Street/Lemnah Drive
- Nason Street at Lemnah Drive
- US Route 7 (South Main Street) at Interstate Access Road
- US Route 7 (South Main Street) at Nason Street
- US Route 7 (South Main Street) at Upper and Lower Welden Street
- US Route 7 (South Main Street) at Fairfield and Lake Streets
- US Route 7 (North Main Street) at JC Penney

An inventory of the existing conditions within the study area is provided in the following section.

## Existing Conditions

Evaluation of the traffic impacts associated with the Project requires a thorough understanding of the transportation network in the study area. Existing conditions observed in the study area include roadway geometrics, traffic control devices, and peak hour traffic volumes. This chapter summarizes the existing conditions observed within the study area.

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### Existing Roadway Network

The following provides a general description of the existing conditions of the roadway segments that form the Federal Street Corridor. **Figure 2** shows lane use and traffic control at key intersections within the Study Area to graphically display the roadway system with regard to the physical conditions.

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#### Lemnah Drive and Allen Street

This 0.43-mile segment includes Lemnah Drive from Nason Street to Lower Welden Street and Allen Street from Lower Welden Street to Stowell Street. Lemnah Drive has one lane in each direction and a posted speed limit of 25 miles per hour (MPH). There is no on-street parking in this segment and sidewalks are provided only on the east side of Allen Street and on a short (320 foot) stretch of Lemnah Drive along the east side of the road running north from Nason Street. Lemnah Drive is stop-controlled at both Lower Welden Street and Nason Street, as both of these streets require free east/west movement due to the lack of available queuing space between the Federal Street Corridor and the railroad crossings. The northern terminus of Lemnah Drive meets Lower Welden Street obliquely, resulting in poor roadway geometry.

Lemnah Drive is a recently improved street; it was extended in 1999 to connect Nason Street to Lower Welden Street. It was extended over three acres of land previously owned by New England Central Railroad (NECR) and it now provides continuous access to commercial / industrial properties including the City's municipal complex. Buildings are restricted to the eastern side of the road, with undeveloped lands adjacent to the NECR railroad line lying to the west acting as open air storage yards. The only bridge in the Study Area is located within this reach,

crossing over Stevens Brook about midway between Lower Welden Street and Nason Street.

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### **Allen / Catherine / Federal Streets**

This 0.36 mile roadway segment begins at Stowell Street and extends north to Kingman Street. Federal Street has designated on-street parking on both sides of the street, whereas Catherine Street has only a few spaces and Allen Street has no on-street parking. Sidewalks are present on the east side of Allen Street and Catherine Street. The posted speed limit is 25 MPH.

This segment is more urban in character and considered a portion of the downtown area of the City of St. Albans. Land use is varied in this segment. The headquarters of the NECR is located within this segment at the intersection of Federal Street with Lake Street. Immediately opposite and to the south of the headquarters is the Giroux Furniture Company building, currently a furniture store. Catherine and Allen Streets are fronted by a mixture of high-density residential and commercial/industrial properties. Between Stowell Street and Stebbins Street, the west side of the road is lined with trees, separating the traveled way from a railroad siding and open air storage yard; the east side of the road is characterized by high-density residential buildings.

This road segment, located near the center of the Study Area, is characterized by the intersection of the south terminus of Federal Street with Lake Street and with Catherine Street. Lake Street has free movement east/west, whereas Catherine and Federal Street are stop-controlled. There are a number of deficiencies in this intersection, leading to conflicts between all modes of travel:

- The Federal Street and Catherine Street alignments are offset through this intersection, leading to motorist confusion, increased congestion, and increased collisions, as evidenced by the intersection being categorized as a high accident location.
- Motor vehicle delay on the stop controlled side streets can lead to impatience and risk-taking during peak periods.
- The amount of pavement in the intersection and lack of traffic controls and pavement markings or other visual keys adds to the confusion.
- Sight distances are obscured by utilities, buildings, and on street parking.
- There is a general lack of pedestrian accommodations, and the distance required to travel by foot without a sidewalk along the south side of Lake Street between Market Street and Catherine Street (front of the Giroux Furniture Company building) is overly long.

Farther south in this segment, the intersection of Allen Street, Catherine Street, Market Street and Stebbins Street is equally deficient, possessing complicated



geometry and poor sight lines due to building interference. There is a significant offset in the alignment between Allen Street and Catherine Street (the principal north/south route) through this intersection. Moreover, because Market Street offers another north/south route, this can complicate the motorist decision-making process. These deficiencies, coupled with the fact that Allen Street and Catherine Street are stop-controlled, whereas Stebbins Street through Market Street has free east/west movement, contributes to the intersection of Stebbins Street with Allen Street being identified as a high-crash location in the Long Range Transportation Plan 2003-2008 (NRPC 2003).

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### **Federal Street (Kingman Street to Lower Newton Street)**

The Federal Street segment commences at Kingman Street and runs north for 0.61 miles along Federal Street to Lower Newton Street. This segment has one lane in each direction with informal on-street parking on both sides of the road and a sidewalk that runs along the east side of the road. The posted speed limit is 25 MPH. There are five minor side streets between Kingman Street and Lower Newton Street, two of which are one-way. Each side street is stop controlled, whereas Federal Street has free north/south movement. There are no signalized intersections within this segment.

Land use in this segment is mostly a mix of single-family residential with some high-density residential and some notable commercial and industrial land uses being present, such as the St. Albans Cooperative Creamery north and west of Hudson Street. Commercial and institutional uses, such as the District Courthouse at the corner of Federal Street and Kingman Street, also front onto Federal Street.

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### **Lower Newton Street**

The Lower Newton Street segment (0.17 miles) represents the northern limit of the Study Area. It commences at the intersection of Lower Newton Street and Federal Street and runs east to North Main Street. This segment has one lane in each direction and a sidewalk running along the south side of the road. The posted speed limit is 25 MPH. The intersection with North Main Street is signalized in an offset four-way configuration. Federal Street is stop-controlled at Lower Newton Street, whereas Lower Newton Street has free east/west movement.

Land use is predominantly single-family residential with the notable exception being the recently demolished factory, formerly known as the Fonda Group Property, just north of the intersection of Federal Street and Lower Newton Street.

An inactive at-grade crossing of Lower Newton Street across the NECR line is present just west of this intersection. In its inactive status, the crossing has no adverse effect on traffic operations, though in the future it could revert to active rail use or it could be rail banked and converted to a rail trail that would connect to the

Missisquoi Valley Rail Trail that currently terminates at North Main Street, less than a mile north of the Federal Street Corridor.

## Existing Traffic Volumes

A traffic volume data collection program was conducted on Wednesday, September 1, 2010 and Thursday, September 2, 2010 to establish the existing traffic flow characteristics within the Study Area. The traffic volume counts consisted of weekday morning (7:00 – 9:00 AM) and weekday evening (4:00 – 6:00 PM) manual turning movement counts (TMC) at seven study area intersections. Copies of the detailed count data are provided in the Appendix, which is included on the attached CD. The TMC locations are depicted in **Figure 2** and include the following locations:

- US Route 7 (North Main Street) at Upper Newton Street/Lower Newton Street
- Lower Newton Street at Federal Street
- Lake Street at Federal Street/Catherine Street
- Catherine Street/Allen Street at Stebbins Street/Market Street
- Lower Welden Street at Allen Street/Lemnah Drive
- Nason Street at Lemnah Drive
- US Route 7 (South Main Street) at the Interstate Access Road

As recommended in a Policy on Geometric Design of Highways and Streets<sup>1</sup> and by VTrans, the appropriate volume condition for analysis and design considerations is the 30<sup>th</sup> highest hour of the year. Given the economic considerations involved in the planning and design of street facilities, this design criterion is selected since the 30<sup>th</sup> highest hourly volume generally reflects a “point of diminishing return” in that a substantial increase in design requirements would accommodate only very few periods of higher traffic volumes. In fact, VTrans guidelines for traffic studies require that traffic volumes be adjusted to reflect the 30<sup>th</sup> highest hour, commonly referred to as Design Hourly Volume (DHV).

Historical traffic data obtained from the nearby VTrans Permanent Count Station P6F029 located on US Route 7, 1.7 miles north of I-89 in Georgia indicate that the 30<sup>th</sup> highest hour typically occurs during the weekday evening peak hour and is approximately nine percent higher than the September weekday evening peak hour volume. Therefore, the September 2010 weekday evening peak hour traffic volumes collected to establish the existing conditions were increased by nine percent to



<sup>1</sup> American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets 6<sup>th</sup> Edition, Washington, D.C., 2011.

represent the DHV (the 30<sup>th</sup> highest hour). To determine an appropriate adjustment factor for the weekday morning peak hour condition, the weekday morning volume from Station P6F029 closest to the 30<sup>th</sup> highest hour was selected for comparison purposes; this weekday morning volume was also found to be nine percent higher than the September weekday morning peak hour volume. Therefore, the September 2010 weekday morning peak hour volumes were also adjusted by nine percent. The adjusted 2010 weekday morning and evening peak hour traffic volume networks are presented in **Figure 3** and **Figure 4**, respectively. Copies of the DHV adjustment calculations are provided in the Appendix.

## Crash History

Historical crash data obtained from VTrans for the five-year period from 2005 to 2009 were reviewed to identify existing high crash locations (HCL) within the Project area. Table 1 provides a general summary of the crash evaluation; a more detailed summary of the data and crash rate calculations is provided in the Appendix. As shown below, two intersections within the Project area were found to be HCLs. These intersections include the signalized intersection of US Route 7 (North Main Street) at Upper Newton Street/Lower Newton Street and the unsignalized intersection of Lake Street at Federal Street/Catherine Street.

**Table 1 Crash Summary**

<b>Intersections</b>	<b>Number of Crashes*</b>	<b>Actual Rate**</b>	<b>Critical Rate**</b>	<b>Actual/Critical Ratio</b>	<b>HCL</b>
US 7 at Upper and Lower Newton St	23	1.286	1.135	1.133	Yes
Lower Newton St at Federal St	6	0.552	1.291	0.427	No
Lake St at Federal St and Catherine St	29	1.891	1.182	1.600	Yes
Catherine St at Stebbins St	2	0.422	1.567	0.269	No
Lower Welden St at Allen St and Lemnah Dr	3	0.351	1.371	0.256	No
Nason St at Lemnah Dr	0	0.000	1.558	0.000	No
US 7 at Nason St	6	0.252	1.054	0.239	No
US 7 at Interstate Access Road	17	0.815	1.091	0.747	No
Intersection Total	86				
<b>Segments</b>					
Lower Newton St	4	3.163	10.345	0.306	No
Federal St	28	5.079	7.104	0.715	No
Nason St	3	6.322	12.837	0.493	No
US 7 from Nason St to St. Albans State Hwy	1	0.363	8.468	0.043	No
Segment Total	36				
Grand Total	122				

\* Number of crashes January 1, 2005 through December 31, 2009

\*\* Rates expressed in crashes per million vehicles.

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## Existing Traffic Operations

Measuring the volume of traffic at Study Area intersections indicates the importance of these intersections to the regional transportation system, but does not necessarily give an indication of the quality of traffic flow. To assess the quality of traffic flow, capacity analyses were conducted to determine how well these intersections serve the traffic demands placed upon them. The traffic performance measures and the evaluation criteria used in the operational analyses are based on the methodology presented in the 2000 Highway Capacity Manual.<sup>2</sup> Proposed roundabouts were evaluated using two analysis tools: SIDRA Intersections<sup>3</sup> software and the National Cooperative Highway Research Program (NCHRP) 572 Roundabout Analysis worksheet.

A primary result of capacity analysis is the assignment of level of service (LOS), which is a qualitative measure describing operational conditions at a given facility under specific traffic volume demands. LOS is dependent on the effect of a number of factors including roadway geometrics, travel speed, delay, freedom to maneuver, and safety. Six levels of service are defined ranging in letter designation from LOS A to LOS F, with LOS A representing the best operating condition and LOS F representing the worst. LOS C describes a stable flow condition and is considered desirable for design hour traffic flow. LOS D is generally considered acceptable where the cost and impacts of making improvements to provide LOS C are deemed unjustifiable. LOS E reflects a condition of longer delay, but can be considered acceptable in a congested area, particularly in cases where traffic control devices and other measures are taken to improve safety or physical/geometric improvements are not considered to avoid environmental, historical, or property impacts.

The results of the 2010 existing condition operational analyses, which were conducted for the signalized and unsignalized intersections within the Study Area, are summarized in **Tables 2 and 3**, respectively. Copies of the existing conditions analyses are provided in the Appendix.

The analysis results indicate that the signalized intersection of US Route 7 at Upper Newton Street/Lower Newton Street operates at LOS B with an average delay of 10 seconds and a volume to capacity ratio ( $v/c$ ) of 0.39 under the 2010 existing weekday morning peak hour volume. Operations are more congested under the 2010 existing weekday evening peak hour volume where the intersection operates at LOS E with an average delay of 61 seconds and a  $v/c$  of 0.82.



<sup>2</sup> 2000 Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington, D.C.

<sup>3</sup> SIDRA Intersection Software, Version 5.1, Akcelik and Associates Pty Ltd.

**Table 2 2010 Existing Signalized Intersection Analysis Summary**

Intersection	Weekday AM Peak Hour			Weekday PM Peak Hour		
	v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
US 7 at Upper Newton St/Lower Newton St	0.39	10	B	0.82	61	E

- 1 Volume to capacity ratio
- 2 Average delay per vehicle expressed in seconds
- 3 Level of service

As shown in Table 3, two of the six unsignalized study area intersections experience long delays and operate at poor levels of service during the 2010 weekday morning and evening peak hours. Vehicles exiting from the unsignalized approaches of the Interstate Access Road and Nason Street to US Route 7 (Main Street) operate at LOS F during both peak hours. Vehicles exiting from the unsignalized approaches of Catherine Street and Federal Street at the Lake Street intersection operate at LOS F during the evening peak hour.

The Federal Street unsignalized approach to the Lower Newton Street intersection also experiences moderate delays under the 2010 weekday evening hour volume, operating at LOS F; under the weekday morning peak hour volume the approach operates at LOS C. The remaining three unsignalized study area intersections of Catherine Street/Allen Street at Stebbins Street/Market Street, Lower Welden Street at Allen Street/Lemnah Drive, and Nason Street at Lemnah Drive operate with minor delays (LOS C or better) during the 2010 weekday morning and evening peak hours.

**Table 3 2010 Existing Unsignalized Intersection Analysis Summary**

Intersection	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
<b>US 7 at Interstate Access Road</b>						
WB lefts from Interstate Access Road	45	72	F	50	99	F
SB lefts from US 7	355	12	B	300	12	B
<b>US 7 at Nason St</b>						
EB movements from Nason St	145	85	F	110	132	F
NB lefts from US 7	90	10	A	125	10	B
<b>Nason St at Lemnah Dr</b>						
EB movements from Nason St	165	4	A	140	5	A
SB lefts from Lemnah Dr	50	13	B	50	13	B
SB rights from Lemnah Dr	65	9	A	65	10	A
<b>Lower Welden St at Allen St/Lemnah Dr</b>						
EB movements from Lower Welden St	210	1	A	265	1	A
WB movements from Lower Welden St	190	1	A	220	1	A
NB movements from Lemnah Dr	135	19	C	135	19	C
SB movements from Allen St	145	18	C	100	18	C
<b>Stebbins St at Catherine St</b>						
EB movements from Stebbins St	100	3	A	80	5	A
SB movements from Catherine St	100	12	B	75	10	B
<b>Lake St at Federal St/Catherine St</b>						
EB movements from Lake St	335	4	A	620	6	A
WB movements from Lake St	250	1	A	315	1	A
NB movements from Catherine St	65	29	D	100	287	F
SB left/through from Federal St	325	20	C	355	433	F
<b>Lower Newton St at Federal St</b>						
WB movements from Lower Newton St	370	6	A	400	6	A
NB movements from Federal St	135	17	C	425	37	F

1 Demand expressed in vehicles per hour  
2 Average delay per vehicle expressed in seconds  
3 Level of service

## Future Conditions

The 2010 and 2030 traffic forecasts for the No Action and Proposed Action alternatives were derived using modeling efforts previously conducted for the 2005 update to the Federal Street Corridor Study (NRPC 2005). This chapter summarizes the development of the 2010 and 2030 traffic volume networks and resulting traffic operational analyses for the No Action and Proposed Action alternatives.

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### Peak Hour Traffic Volume Networks

In 2005, the NRPC, the City of St. Albans, and the Town of St. Albans retained the services of a consultant (Resource Systems Group, Inc.) to assist in the development of the Federal Street Corridor Study – 2005 Update (NRPC 2005). As part of that study, a travel demand model was developed to assist with estimating future traffic volumes. The model was created using Paramics software, a micro-simulation program that estimates the behavior of individual vehicles traveling on the transportation network. The model area encompasses the roadway network surrounded by: US Route 7 from the Interstate Access Road to Upper and Lower Newton Streets, Lower Newton Street from US Route 7 to Federal Street; and Federal, Catherine, Market, Allen, and Lemnah Streets. The 2005 Paramics model was updated and recalibrated to reflect the 2010 existing weekday morning and evening peak hours (described in the previous chapter) for the purposes of evaluating the effect of the Proposed Action on the peak hour volumes within the Study Area and forecasting traffic to the year 2030.

With a base year condition of 2010 for the existing conditions, a twenty year forecast to 2030 was selected for analysis purposes. The 2030 No Action traffic volumes were estimated by reviewing recent traffic growth trends recorded along US Route 7 by the VTrans Permanent Count Station P6F029 located in Georgia, combined with the 2009 to 2029 twenty year growth factor by regression analysis group prepared by VTrans for this same segment of US Route 7. Both the historical data and projected growth factors target an average annual growth rate of 0.5 percent per year. To provide a slightly conservative estimate of 2030 traffic volumes, an average annual growth rate of 1.0 percent was used to forecast for the first ten years of growth (2010 to 2020) and an average annual rate of 0.5 percent was used to forecast for the second ten years (2020 to 2030). This slightly conservative approach was taken to account



for potential unidentified site-specific development or redevelopment projects that could occur near or within the Study Area and affect traffic growth.

It is important to note that the Paramics traffic model includes more US Route 7 intersections than the two intersections (Upper Newton Street/Lower Newton Street and the Interstate Access Road) where TMC data was collected. These intersections include the US Route 7 signalized intersections of Lower Welden Street, Fairfield Street, Lake Street, and JC Penney Plaza and the unsignalized intersection of Nason Street. Volumes at these locations were estimated based on output provided from the 2005 Paramics model update and have been included in the network development for informational purposes. The 2010 No Action traffic volume networks were previously established (as the existing condition) and are shown in **Figures 3 and 4**. The 2030 No Action traffic volume networks for the weekday morning and evening peak hours are shown in **Figures 5 and 6**, respectively.

Once calibrated to the existing condition, the Paramics model was modified to reflect the Proposed Action and to assess the sensitivity of traffic volume assignments under various improvement options for the intersections of Lake Street at Federal Street/Catherine Street and Lower Welden Street at Lemnah Drive/Allen Street. The raw Paramics model output volumes were adjusted through the typical traffic modeling pivoting procedure to forecast and estimate weekday peak hour volumes for the Proposed Action. The 2010 and 2030 Proposed Action traffic volume networks for the weekday morning and evening peak hour conditions are shown in **Figures 7 through 10**.

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## Signal Warrant Analyses

Signal warrants were evaluated for several of the intersections along the Federal Street Corridor using the Peak Hour Volume Warrant criteria outlined in the Manual on Uniform Traffic Control Devices<sup>4</sup>. These included the intersections of US Route 7 at the Interstate Access Road, Federal Street with Lower Welden Street, Federal Street with Lake Street, and Federal Street with Lower Newton Street. The peak hour warrants indicated that the intersections of US Route 7 at the Interstate Access Road, Lake Street at Federal Street/Catherine Street, and Lower Newton Street at Federal Street would meet peak hour traffic signal warrants. However, the intersection of Federal Street at Lower Welden Street did not meet the peak hour warrant for a traffic signal.



<sup>4</sup> Manual on Uniform Traffic Control Devices, US Department of Transportation, Federal Highway Administration, 2009.

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## Additional Analysis Assumptions

It is important to note that there were a series of assumptions made and incorporated into the traffic operational analysis with regard to the Proposed Action that adversely affect intersection capacity results, but promote overall safer operations for pedestrians and motorists. Items, such as modified signal timing and phasing plans to accommodate split phases where vehicle conflicts can be eliminated or the incorporation of an exclusive pedestrian phase, reduce the overall capacity of an intersection and increase delay, but improve the overall quality of travel. Specific locations where such items were included in the traffic operational analysis include:

- US Route 7 at Upper Newton Street/Lower Newton Street would have new signal controller equipment with coordination and an exclusive pedestrian phase. In addition, it is assumed that the Upper and Lower Newton Street approaches would be split-phased due to the alignment of the intersection (presently running concurrently).
- US Route 7 at the Interstate Access Road would be a new four-way signalized intersection with the Nason Street Connector. This intersection is assumed to have an actuated exclusive pedestrian phase. In addition, the Interstate Access Road and Nason Street Connector approaches are assumed to be split phased to minimize vehicle conflicts.
- Lake Street at Federal Street/Catherine Street would be signalized with coordination to Main Street and an actuated exclusive pedestrian phase. In addition, the Lake Street approaches are assumed to be split-phased to avoid vehicle conflicts through this elongated intersection. Split-phasing is less efficient than other possible intersection configurations at this location, but necessary to avoid roadway widening and property impacts.
- Federal Street at Lower Newton Street would be signalized with coordination and an actuated exclusive pedestrian phase.
- The existing signalized Main Street (US Route 7) intersections with JC Penney Plaza, Lake Street, Fairfield Street, and Upper Welden Street/Lower Welden Street would operate under coordination with exclusive pedestrian phases. Although these intersections are not part of the Study Area, they were included in the analysis to provide a system-wide review of the Project's impacts (i.e., the entire Main Street corridor is assumed to operate under coordination and the signal vehicle detection improvements currently in progress for the intersections of Main Street with Lake Street and Fairfield Street are assumed to be complete).

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## 2010 and 2030 No Action and Proposed Action Traffic Operations

This section describes the results of the traffic operational analyses that were conducted for the 2010 No-Action and Proposed Action, and the 2030 No-Action and Proposed Action conditions. **Table 4** summarizes the results of the traffic operational analyses for the existing and proposed signalized intersections. **Tables 5 and 6** summarized the 2010 and 2030 analysis results, respectively, for the unsignalized intersections. **Tables 7 and 8** summarize the 2010 and 2030 roundabout analysis results for 2010 and 2030 under the Proposed Action.

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### 2010 No-Action and Proposed Action

The signalized intersection of North Main Street with Upper Newton Street and Lower Newton Street is expected to degrade slightly from LOS B to LOS C under the 2010 weekday morning peak hour as a result of the Project, and remain unchanged at LOS E under the weekday evening peak hour. As discussed previously herein, the incorporation of an actuated exclusive pedestrian phase and split phasing of the offset side streets under the Proposed Action partially contribute toward the minor change in operations. This intersection was classified as a High Crash Location (HCL) by VTrans, based on crash data for the five-year period from 2005 to 2009. Based on historical crash trends at this location, the inclusion of the split phasing and the exclusive pedestrian phase could potentially reduce crashes at this location by 33 percent (addressing 8 out of 24 crashes over the five-year period).

The remaining existing signalized intersections along the Main Street US Route 7 corridor (JC Penney, Lake Street, Fairfield Street, and Upper Welden Street/Lower Welden Street) are projected to operate at the same or slightly better levels of service with the Proposed Action; all intersections operating at LOS C or better. It is important to point out that the peak hour traffic volume reductions along the US Route 7 corridor associated with the Proposed Action result in an average reduction of 30 percent in the  $v/c$  ratios at these existing signalized intersections, due to diversion to Federal Street Corridor.

The three new signalized intersections included under the Proposed Action include South Main Street at the Interstate Access Road/Nason Street Connector, Lake Street at Federal Street/Catherine Street, and Lower Newton Street at Federal Street. All three of these locations experience LOS F operations under their existing unsignalized 2010 No-Action condition. Under the 2010 Proposed Action condition, the signalized intersection of South Main Street at Interstate Access Road/Nason Street Connector is projected to operate at LOS D during the weekday morning and evening peak hours and the intersection of Lower Newton Street at Federal Street is projected to operate at LOS C.



The proposed signalized intersection of Lake Street at Federal Street/Catherine Street is projected to operate at LOS D under the weekday morning peak hour and LOS E under the weekday evening peak hour. The longer delays incurred at this location are a result of selecting a Proposed Action that is focused on minimizing property impacts and providing exclusive pedestrian phases. In addition, it should be pointed out that the anticipated LOS E signalized intersection delay (69 seconds) is substantially lower than the LOS F unsignalized delay (287 seconds from Catherine Street and 433 seconds from Federal Street). As discussed previously, LOS E can be considered acceptable in congested areas where safety improvements are made that reduce potential intersection capacity and/or at locations where physical improvements are not considered due to environmental, historical, or property impacts.

The proposed single lane roundabout at the intersection of Lower Welden Street and Allen Street/Lemnah Drive is projected to operate at LOS A under the 2010 Proposed Action condition during the weekday morning and evening peak hours.

The unsignalized intersection of South Main Street and Nason Street substantially improves under the Proposed Action with vehicle delays exiting from Nason Street improving from LOS F to LOS B during both peak hours. This improvement is a result of motorists using the new signalized intersection at South Main Street and the Nason Street Connector, resulting in lower through and turning movement volumes at the unsignalized Nason Street intersection. The remaining unsignalized intersections of Nason Street at Lemnah Drive and Stebbins Street at Catherine Street are projected to operate at acceptable levels of service under the 2010 No-Action and Proposed Action conditions during both peak hours.

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## **2030 No-Action and Proposed Action**

Similar to the 2010 condition, the intersection of North Main Street with Upper Newton Street and Lower Newton Street would be expected to degrade slightly from LOS B to LOS C during the 2030 weekday morning peak hour as a result of the Proposed Action. Traffic operations during the 2030 weekday evening peak hour would be expected to degrade from LOS E (67 seconds delay) to LOS F (91 seconds delay) during the weekday evening peak hour as a result of the Proposed Action. As discussed previously, these changes in level of service are partially attributed to incorporating safety measures and pedestrian phases into the intersection's operations. The other factor contributing toward the change in LOS is the diversion of traffic from US Route 7 northbound under the Proposed Action condition utilizing Federal Street and Lower Newton Street to access US Route 7 north of the Study Area.

The other existing signalized intersections along the US Route 7 corridor (JC Penney, Lake Street, Fairfield Street, and Upper Welden Street/Lower Welden Street) are projected to operate at the same or slightly better LOS with the Proposed Action



(LOS C or better). Similar to the 2010 condition, these intersections would experience substantially lower v/c ratios (10 to 30% lower) as a result of the Proposed Action.

Two of the three proposed signalized intersections, South Main Street at Interstate Access Road/Nason Street Connector and Lake Street at Federal Street/Catherine Street, are projected to operate at LOS E under the 2030 Proposed Action condition during the peak hours. As discussed previously, the longer delays at these locations are attributed to the incorporation of safety measures and exclusive pedestrian phases. It should be noted that the v/c ratios at these locations indicate that the intersections are operating well below capacity for the 2030 forecast year. The third proposed signalized intersection of Lower Newton Street and Federal Street is projected to operate at LOS C.

The proposed single lane roundabout at the intersection of Lower Welden Street and Allen Street/Lemnah Drive is projected to operate at LOS B or better under the 2030 Proposed Action condition during the weekday morning and evening peak hours.

Similar to the 2010 conditions, traffic operations at the South Main Street and Nason Street unsignalized intersection are projected to substantially improve in 2030 with the Proposed Action. Delays for vehicles exiting from Nason Street are projected to decrease from 340 seconds and 526 seconds (LOS F) during the morning and evening peak hours respectively, to only 17 seconds (LOS C) with the Proposed Action.

All traffic movements at the unsignalized intersection of Stebbins Street at Catherine Street are projected to operate at LOS B or better under the 2030 No-Action and Proposed Action conditions. At the unsignalized intersection of Nason Street at Lemnah Drive, left-turns exiting from the stop-controlled side street approaches (Nason Street) are projected to operate at LOS E during the 2030 peak hours with moderate delays (40 seconds or less). Left-turns from Lemnah Drive are projected to operate at LOS A.

**Table 4 2010 and 2030 Signalized Intersection Analysis Summary**

Intersection	Period	2010 No Action			2010 Proposed Action			2030 No Action			2030 Proposed Action		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
US Route 7 @ Nason St Connector & St Albans State Highway	AM Peak	Unsignalized			0.66	44	D	Unsignalized			0.81	68	E
	PM Peak	Unsignalized			0.71	48	D	Unsignalized			0.87	73	E
Lake St @ Federal St & Catherine St	AM Peak	Unsignalized			0.61	43	D	Unsignalized			0.67	59	E
	PM Peak	Unsignalized			0.80	69	E	Unsignalized			0.90	65	E
Lower Newton St @ Federal St	AM Peak	Unsignalized			0.31	33	C	Unsignalized			0.34	31	C
	PM Peak	Unsignalized			0.45	29	C	Unsignalized			0.53	26	C
US Route 7 @ Upper Newton Street & Lower Newton Street	AM Peak	0.39	10	B	0.41	20	C	0.45	11	B	0.48	20	C
	PM Peak	0.82	61	E	0.85	58	E	0.91	67	E	1.11	91	F
US Route 7 @ JC Penney Plaza	AM Peak	0.42	11	B	0.32	7	A	0.47	11	B	0.38	7	A
	PM Peak	0.66	16	B	0.51	11	B	0.72	16	B	0.59	8	A
US Route 7 @ Lake Street	AM Peak	0.51	24	C	0.36	21	C	0.60	25	C	0.46	21	C
	PM Peak	0.79	28	C	0.57	29	C	0.92	33	C	0.70	25	C
US Route 7 @ Fairfield Street	AM Peak	0.46	26	C	0.33	22	C	0.54	29	C	0.38	25	C
	PM Peak	0.64	33	C	0.47	24	C	0.75	51	D	0.59	29	C
US Route 7 @ Upper Welden Street & Lower Welden Street	AM Peak	0.59	20	C	0.34	15	B	0.71	25	C	0.50	26	C
	PM Peak	0.83	31	C	0.55	24	C	0.98	49	D	0.69	16	B

- 1 Volume to capacity ratio
- 2 Average delay per vehicle expressed in seconds
- 3 Intersection level of service

**Table 5 2010 Unsignalized Intersection Analysis Summary**

Intersection	2010 No Action						2010 Proposed Action					
	Weekday AM			Weekday PM			Weekday AM			Weekday PM		
	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
US Route 7 at St Albans State Highway												
WB lefts from St Albans State Highway	45	72	F	50	99	F	Signalized			Signalized		
SB lefts from US Route 7	355	12	B	300	12	B						
US Route 7 at Nason St												
EB movements from Nason St	145	85	F	110	132	F	60	14	B	30	14	B
NB lefts from US Route 7	90	10	A	125	10	B	45	8	A	35	8	A
Nason St at Lemnah Dr												
EB movements from Nason St	165	4	A	140	5	A	-	-	-	-	-	-
EB lefts from Nason St	-	-	-	-	-	-	95	27	D	95	28	D
EB through/right from Nason St	-	-	-	-	-	-	70	13	B	50	13	B
WB movements from Nason St	-	-	-	-	-	-	55	19	C	40	21	C
NB lefts from Nason St Connector	-	-	-	-	-	-	45	8	A	70	9	A
SB lefts from Lemnah Dr	50	13	B	50	13	B	5	8	A	5	8	A
SB rights from Lemnah Dr	65	9	A	65	10	A	-	-	-	-	-	-
Lower Welden St at Allen St/Lemnah Dr												
EB movements from Lower Welden St	210	1	A	265	1	A	See Roundabout			See Roundabout		
WB movements from Lower Welden St	190	1	A	220	1	A	Table 3.2-6			Table 3.2-6		
NB movements from Lemnah Dr	135	19	C	135	19	C						
SB movements from Allen St	145	18	C	100	18	C						

- 1 Demand expressed in vehicles per hour
- 2 Average delay per vehicle expressed in seconds
- 3 Level of service

**Table 5 (cont.) 2010 Unsignalized Intersection Analysis Summary**

Intersection	2010 No Action						2010 Proposed Action					
	Weekday AM			Weekday PM			Weekday AM			Weekday PM		
	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
Stebbins St at Catherine St												
EB movements from Stebbins St	100	3	A	80	5	A	45	11	B	35	12	B
WB movements from Stebbins St	-	-	-	-	-	-	25	10	A	50	11	B
SB movements from Catherine St	100	12	B	75	10	B	-	-	-	-	-	-
Lake St at Federal St/Catherine St												
EB movements from Lake St	335	4	A	620	6	A	Signalized			Signalized		
WB movements from Lake St	250	1	A	315	1	A	Signalized			Signalized		
NB movements from Catherine St	65	29	D	100	287	F	Signalized			Signalized		
SB left/through from Federal St	325	20	C	355	433	F	Signalized			Signalized		
Lower Newton St at Federal St												
WB movements from Lower Newton St	370	6	A	400	6	A	Signalized			Signalized		
NB movements from Federal St	135	17	C	425	37	F	Signalized			Signalized		

- 1 Demand expressed in vehicles per hour
- 2 Average delay per vehicle expressed in seconds
- 3 Level of service

**Table 6 2030 Unsignalized Intersection Analysis Summary**

Intersection	2030 No Action						2030 Proposed Action					
	Weekday AM			Weekday PM			Weekday AM			Weekday PM		
	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
US Route 7 at St Albans State Highway												
WB lefts from SASH	55	~	F	60	~	F	Signalized			Signalized		
SB lefts from US Route 7	415	15	B	345	15	B						
US Route 7 at Nason St												
EB movements from Nason St	180	340	F	135	526	F	70	17	C	45	17	C
NB lefts from US Route 7	110	10	A	140	11	B	55	9	A	35	9	A
Nason St at Lemnah Dr												
EB movements from Nason St	195	4	A	170	5	A	-	-	-	-	-	-
EB lefts from Nason St	-	-	-	-	-	-	110	32	D	115	40	E
EB through/right from Nason St	-	-	-	-	-	-	85	14	B	50	14	B
WB movements from Nason St	-	-	-	-	-	-	75	37	E	50	24	C
NB lefts from Nason St Connector	-	-	-	-	-	-	45	9	A	45	9	A
SB lefts from Lemnah Dr	70	15	C	60	14	B	5	8	A	5	8	A
SB rights from Lemnah Dr	80	10	A	80	10	A	-	-	-	-	-	-
Lower Welden St at Allen St/Lemnah Dr												
EB movements from Lower Welden St	260	1	A	315	1	A	See Roundabout			See Roundabout		
WB movements from Lower Welden St	235	1	A	255	1	A	Table 3.2-7			Table 3.2-7		
NB movements from Lemnah Dr	165	33	D	155	28	D						
SB movements from Allen St	180	29	D	120	24	C						

1 Demand expressed in vehicles per hour  
 2 Average delay per vehicle expressed in seconds  
 3 Level of service

**Table 6 (cont.) 2030 Unsignalized Intersection Analysis Summary**

Intersection	2030 No Action						2030 Proposed Action					
	Weekday AM			Weekday PM			Weekday AM			Weekday PM		
	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	Demand <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
Stebbins St at Catherine St												
EB movements from Stebbins St	130	4	A	90	5	A	50	11	B	35	12	B
WB movements from Stebbins St	-	-	-	-	-	-	45	10	A	80	11	B
SB movements from Catherine St	125	13	B	90	11	B	-	-	-	-	-	-
Lake St at Federal St/Catherine St												
EB movements from Lake St	390	5	A	720	7	A	Signalized			Signalized		
WB movements from Lake St	315	1	A	375	1	A						
NB movements from Catherine St	90	97	F	120	~	F						
SB left/through from Federal St	385	39	E	95	~	F						
Lower Newton St at Federal St												
WB movements from Lower Newton St	415	6	A	470	6	A	Signalized			Signalized		
NB movements from Federal St	155	22	C	500	115	F						

- 1 Demand expressed in vehicles per hour
- 2 Average delay per vehicle expressed in seconds
- 3 Level of service

**Table 7 2010 Roundabout Capacity Analysis Summary at Lower Welden Street**

Period	Approach	2010 Proposed Action <sup>1</sup>		2010 Proposed Action <sup>2</sup>		2010 Proposed Action <sup>3</sup>		2010 Proposed Action <sup>4</sup>	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
<b>AM Peak</b>	NB	9	A	10	A	7	A	6	A
	WB	8	A	7	A	6	A	6	A
	SB	8	A	7	A	6	A	6	A
	EB	14	B	6	A	5	A	6	A
	Overall	10	A					6	A
<b>PM Peak</b>	NB	9	A	8	A	6	A	6	A
	WB	8	A	8	A	6	A	7	A
	SB	9	A	9	A	7	A	8	A
	EB	12	B	7	A	5	A	6	A
	Overall	10	A					7	A

- 1 Output from Sidra Intersection with HCM 2010 methodology
- 2 Output from Sidra Intersection with HCM 2000 lower methodology
- 3 Output from Sidra Intersection with HCM 2000 higher methodology
- 4 NCHRP spreadsheet

**Table 8 2030 Roundabout Capacity Analysis Summary at Lower Welden Street**

Period	Approach	2030 Proposed Action <sup>1</sup>		2030 Proposed Action <sup>2</sup>		2030 Proposed Action <sup>3</sup>		2030 Proposed Action <sup>4</sup>	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
<b>AM Peak</b>	NB	11	B	11	B	8	A	7	A
	WB	8	A	8	A	6	A	7	A
	SB	9	A	8	A	6	A	6	A
	EB	17	C	6	A	5	A	7	A
	Overall	12	B					7	A
<b>PM Peak</b>	NB	10	A	9	A	7	A	7	A
	WB	10	B	10	B	8	A	7	A
	SB	10	A	9	A	7	A	9	A
	EB	18	C	7	A	5	A	8	A
	Overall	12	B					8	A

- 1 Output from Sidra Intersection with HCM 2010 methodology
- 2 Output from Sidra Intersection with HCM 2000 lower methodology
- 3 Output from Sidra Intersection with HCM 2000 higher methodology
- 4 NCHRP spreadsheet

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# 4

## Conclusions

Main Street (US Route 7) is the primary north-south corridor through the City of St. Albans. Heavy truck and commuter traffic often create congestion and peak hour delay through the downtown. Motor vehicle congestion has a negative impact on the livability and safety of the otherwise pedestrian-focused commercial downtown. The Federal Street Multimodal Connector Project would reconstruct the Federal Street Corridor to improve its use by automobiles, trucks, pedestrians, bicyclists, and public transit in order to create a parallel urban collector route to divert traffic from the City's downtown and create an alternative access to I-89.

Traffic evaluation of the 2010 existing conditions indicates that the signalized intersection of North Main Street with Upper and Lower Newton Streets and the unsignalized intersections of South Main Street with the Interstate Access Road, South Main Street with Nason Street, Lake Street with Federal Street and Catherine Street, and Lower Newton Street with Federal Street currently experience congestion and long delays during peak hour conditions. In addition, two of these intersections were found to be HCLs - the signalized intersection of North Main Street at Upper and Lower Newton Streets and the unsignalized intersection of Lake Street at Federal Street and Catherine Street.

The Proposed Action balances the need for traffic capacity and safety improvements with environmental, historical, and property impacts. As a result, lower levels of service may be considered acceptable in congested areas, particularly in cases where traffic control devices and other measures are taken to improve safety or where physical/geometric improvements are not considered to avoid sensitive impacts. Improvements such as providing split-phasing on side streets at signalized intersections and installing exclusive pedestrian phases have been incorporated into the Proposed Action to address existing and potential future safety concerns. It is important to note that these types of improvements adversely affect intersection capacity and increase delay, but improve the overall quality of travel. The provision of pedestrian amenities, and particularly exclusive pedestrian phases, at signalized intersections is a key component to creating the multimodal corridor envisioned by the City.

Under the Proposed Action, the intersection of North Main Street with Upper Newton Street and Lower Newton Street would be expected to degrade slightly from LOS B to LOS C during the 2030 weekday morning peak hour. Traffic operations



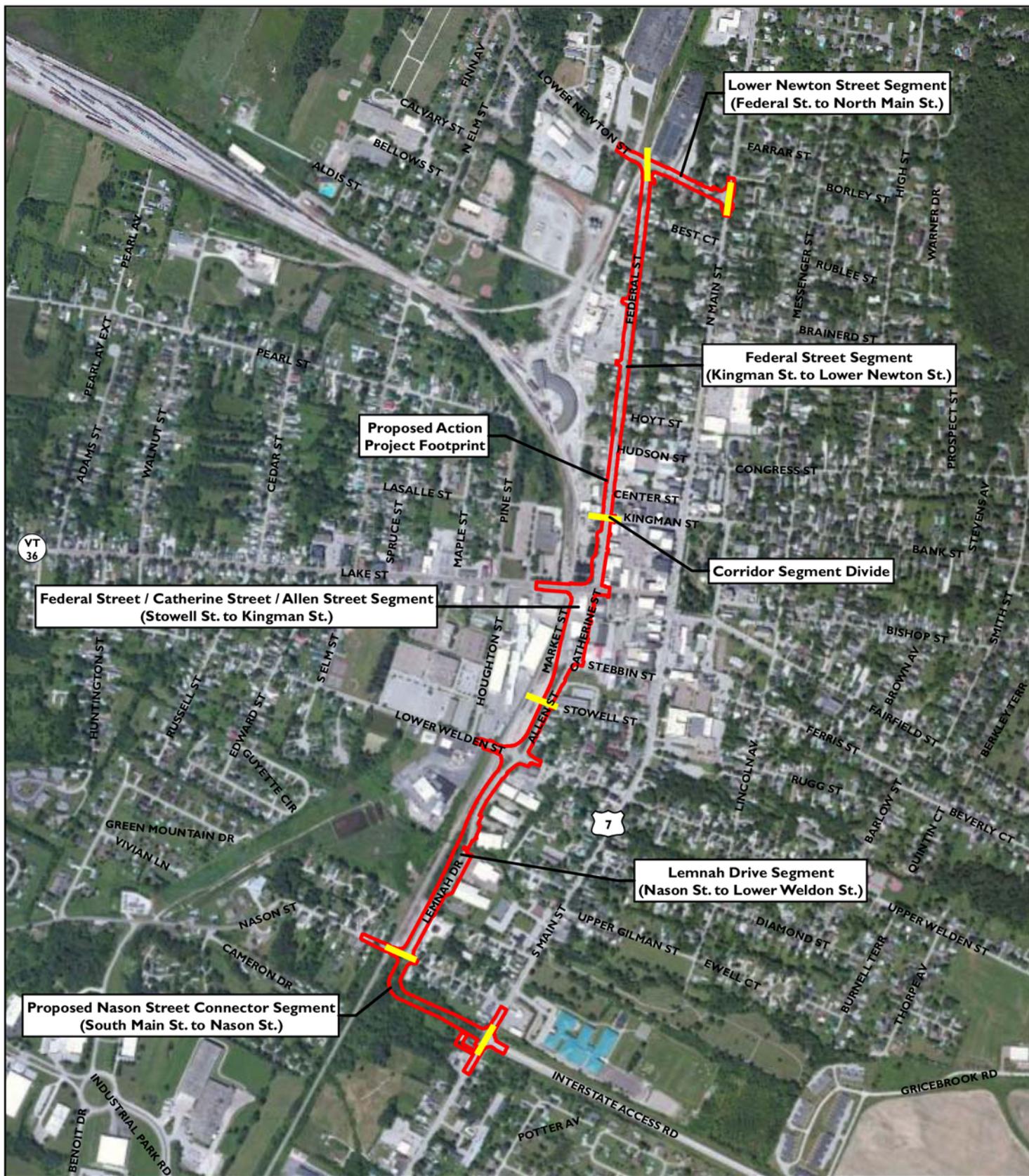
during the 2030 weekday evening peak hour would be expected to degrade from LOS E (67 seconds delay) to LOS F (91 seconds delay) during the weekday evening peak hour as a result of the Proposed Action. However, as discussed previously, these changes in level of service are partially attributed to incorporating safety measures and pedestrian phases into the intersection's operations. The other existing signalized intersections along the US Route 7 corridor (JC Penney, Lake Street, Fairfield Street, and Upper Welden Street/Lower Welden Street) are projected to experience substantially lower v/c ratios (10 to 30% lower) as a result of the Proposed Action.

Two of the three proposed signalized intersections, South Main Street at Interstate Access Road/Nason Street Connector and Lake Street at Federal Street/Catherine Street, are projected to operate at LOS E under the 2030 Proposed Action condition during the peak hours as a result of the incorporation of safety measures and exclusive pedestrian phases. It should be noted that the v/c ratios at these locations indicate that the intersections are operating well below capacity for the 2030 forecast year. The third proposed signalized intersection of Lower Newton Street and Federal Street is projected to operate at LOS C.

The proposed single lane roundabout at the intersection of Lower Welden Street and Allen Street/Lemnah Drive is projected to operate at LOS B or better under the 2030 Proposed Action condition during the weekday morning and evening peak hours.

Traffic operations at the South Main Street and Nason Street unsignalized intersection are projected to substantially improve in 2030 with the Proposed Action. Delays for vehicles exiting from Nason Street are projected to decrease from 340 seconds and 526 seconds (LOS F) during the morning and evening peak hours respectively, to only 17 seconds (LOS C) with the Proposed Action.

All traffic movements at the unsignalized intersection of Stebbins Street at Catherine Street are projected to operate at LOS B or better under the 2030 No-Action and Proposed Action conditions. At the unsignalized intersection of Nason Street at Lemnah Drive, left-turns exiting from the stop-controlled side street approaches (Nason Street) are projected to operate at LOS E during the 2030 peak hours with moderate delays (40 seconds or less). Left-turns from Lemnah Drive are projected to operate at LOS A.



Lower Newton Street Segment  
(Federal St. to North Main St.)

Federal Street Segment  
(Kingman St. to Lower Newton St.)

Proposed Action  
Project Footprint

Corridor Segment Divide

Federal Street / Catherine Street / Allen Street Segment  
(Stowell St. to Kingman St.)

Lemnah Drive Segment  
(Nason St. to Lower Weldon St.)

Proposed Nason Street Connector Segment  
(South Main St. to Nason St.)

**VHB** Vanasse Hangen Brustlin, Inc.

Figure 1  
Corridor Segment Designations  
Federal Street Multimodal Connector  
City of St. Albans, Vermont

Legend

- Proposed Action Project Footprint
- Segment Divide

0 1,000 2,000 Feet

**LEGEND**

-  Signalized Intersection
- STOP** Stop Controlled Intersection
-  Turning Movement Count Location

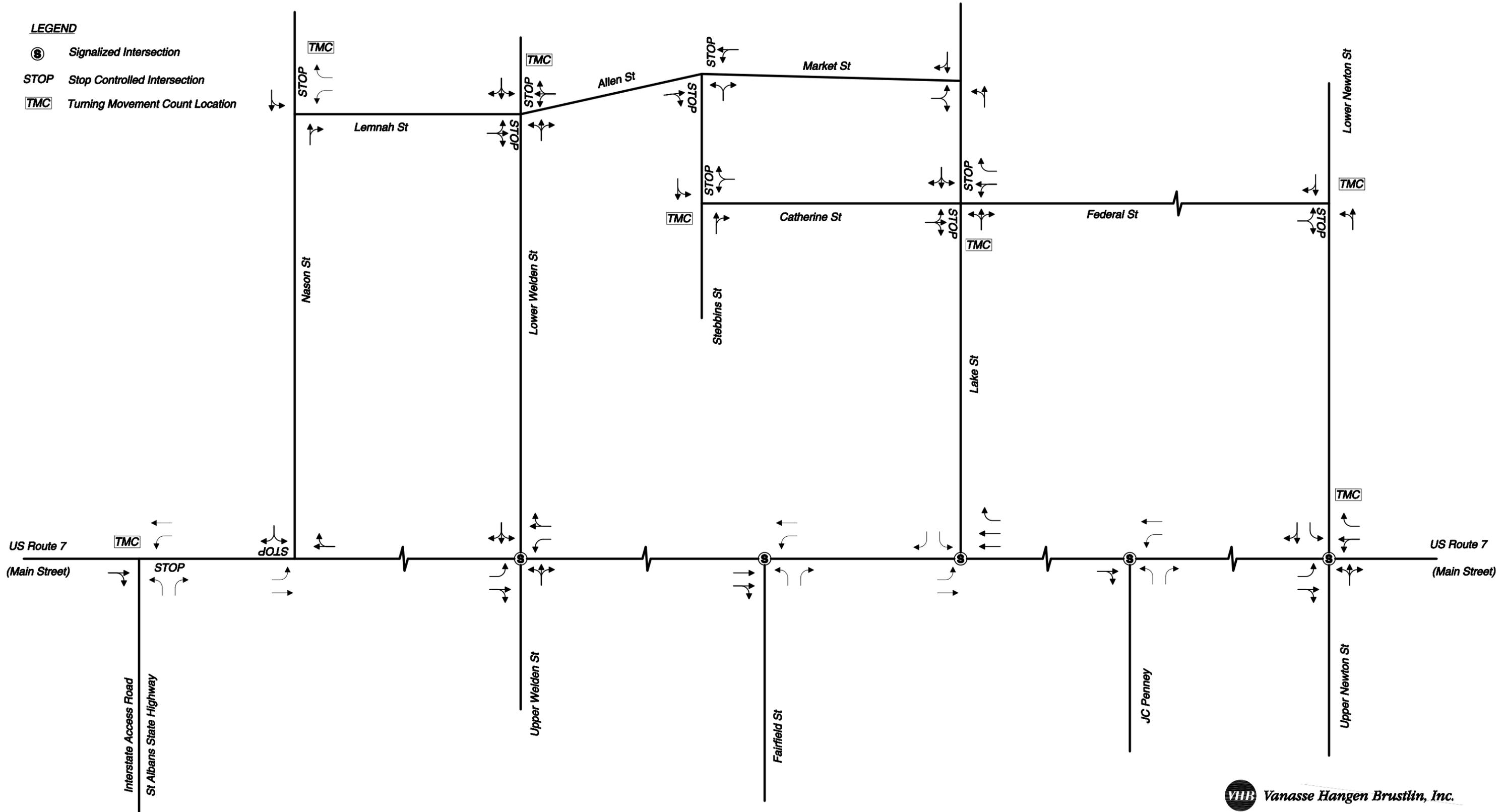


Figure 2  
Existing Lane Use and Traffic Control  
Federal Street Corridor



Not to Scale

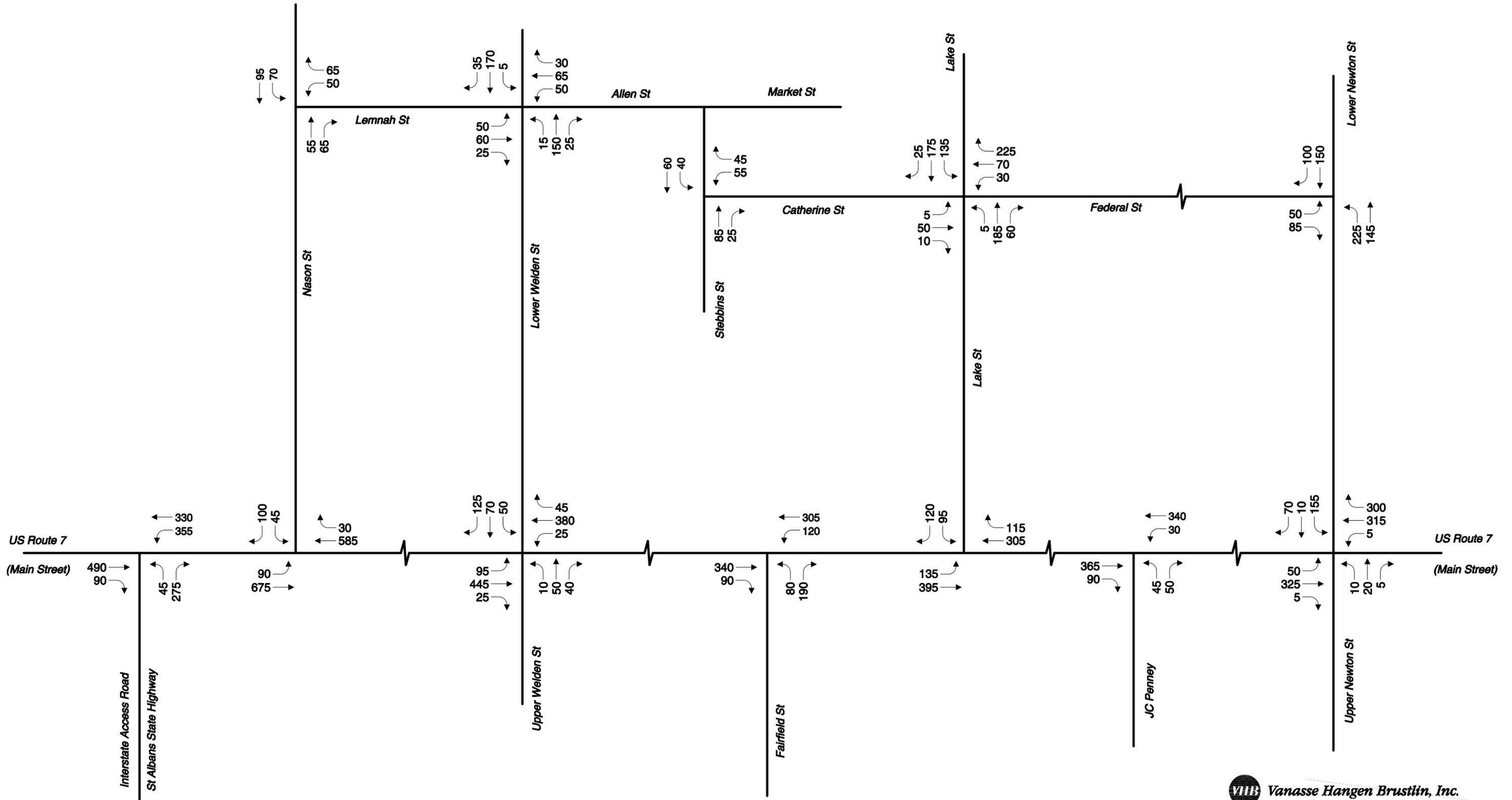


Figure 3  
 2010 Weekday Peak Hour Volumes  
 No-Action AM Peak Hour  
 Federal Street Corridor

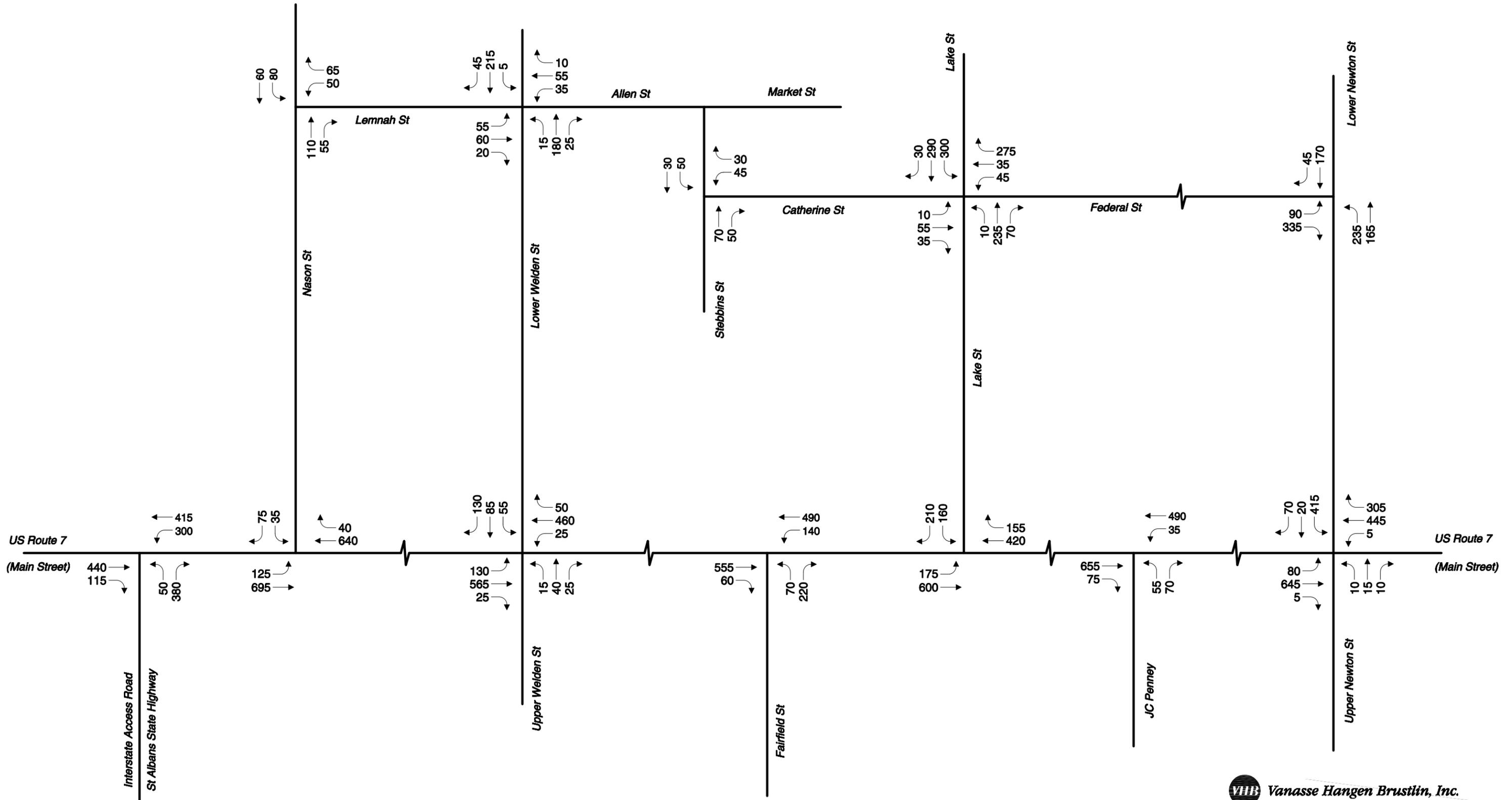


Figure 4  
 2010 Weekday Peak Hour Volumes  
 No-Action PM Peak Hour  
 Federal Street Corridor

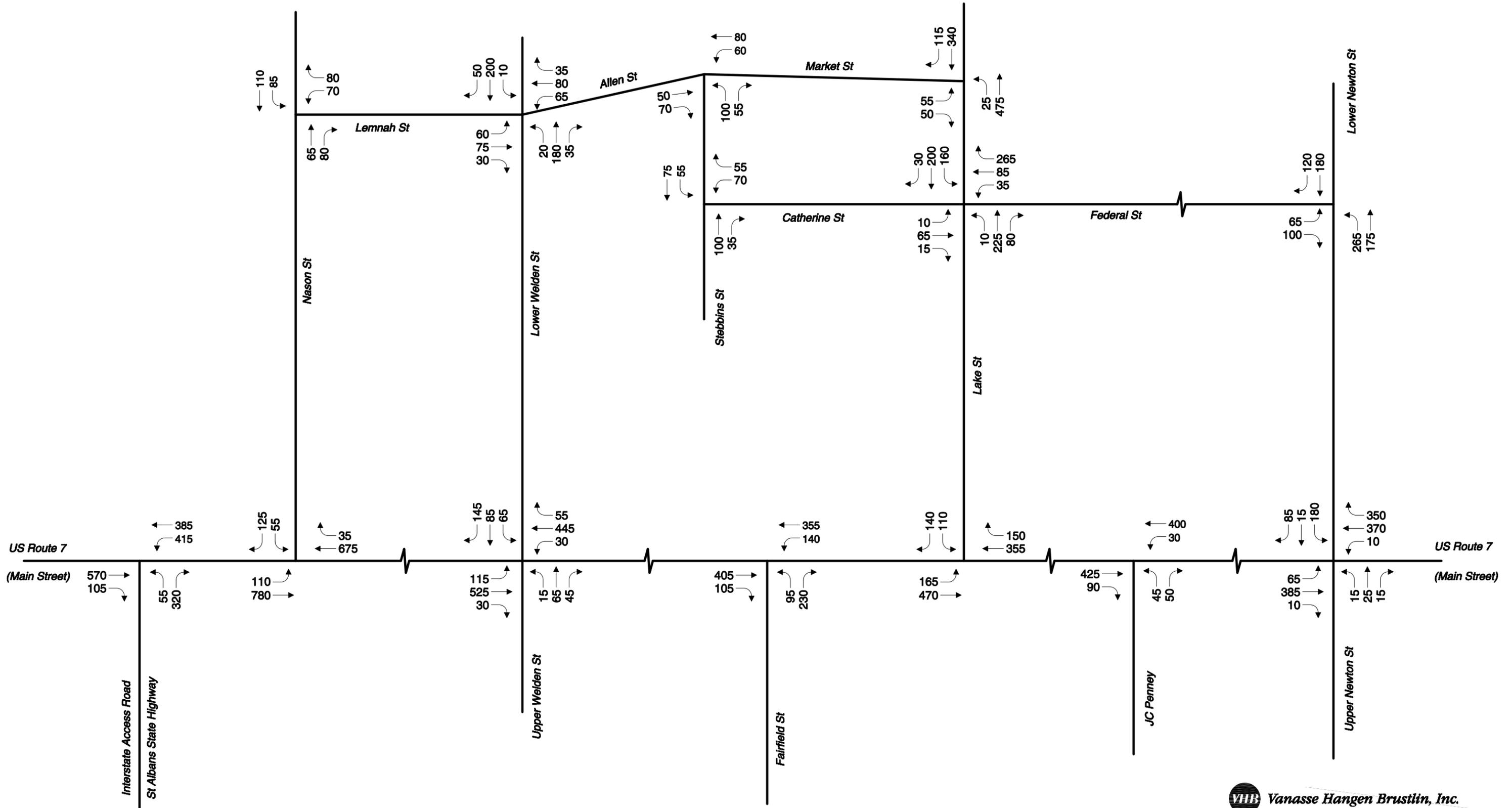


Figure 5  
 2030 Weekday Peak Hour Volumes  
 No-Action AM Peak Hour  
 Federal Street Corridor

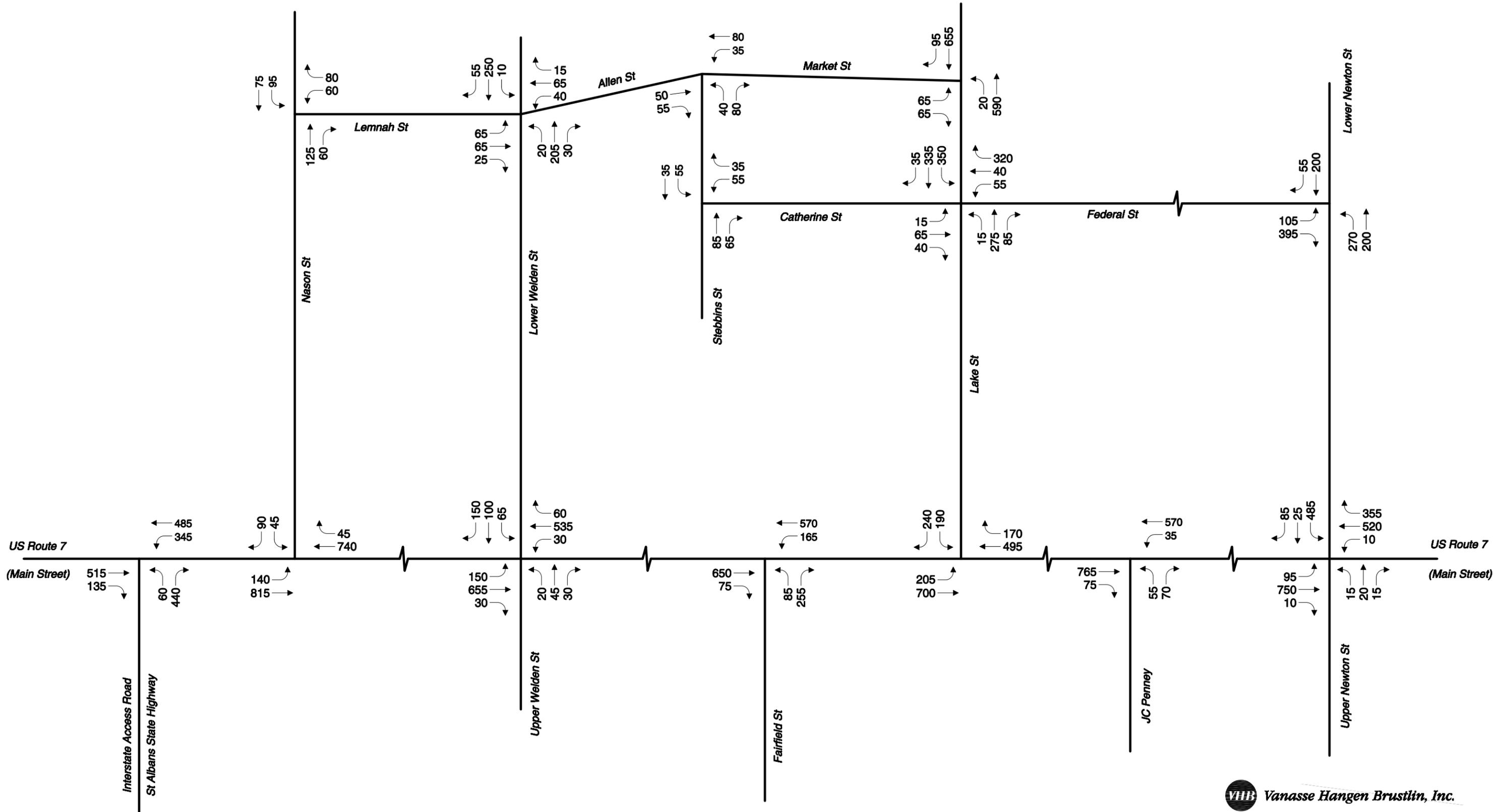


Figure 6  
 2030 Weekday Peak Hour Volumes  
 No-Action PM Peak Hour  
 Federal Street Corridor



Not to Scale

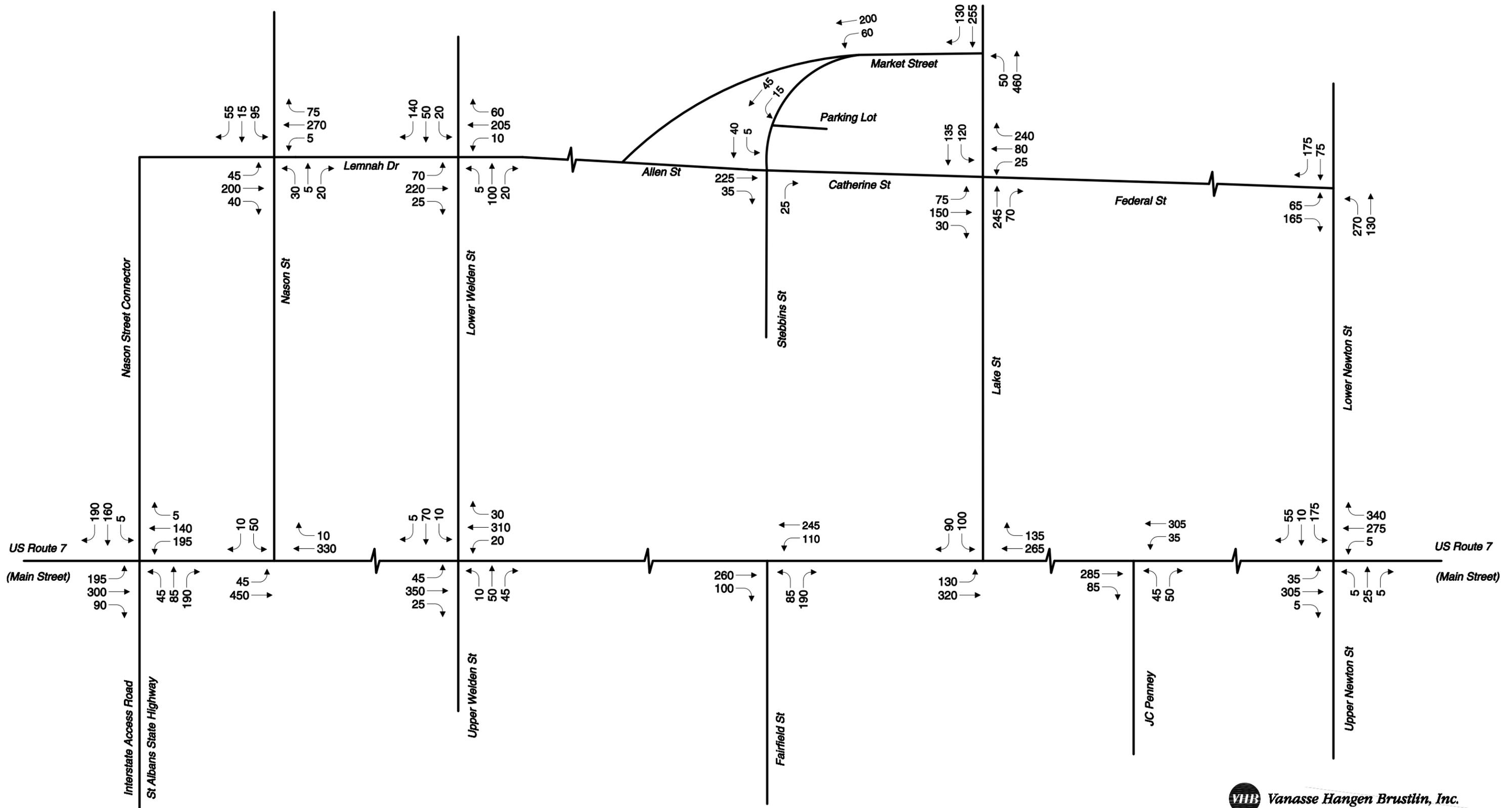


Figure 7  
 2010 Weekday Peak Hour Volumes  
 Proposed Action AM Peak Hour  
 Federal Street Corridor

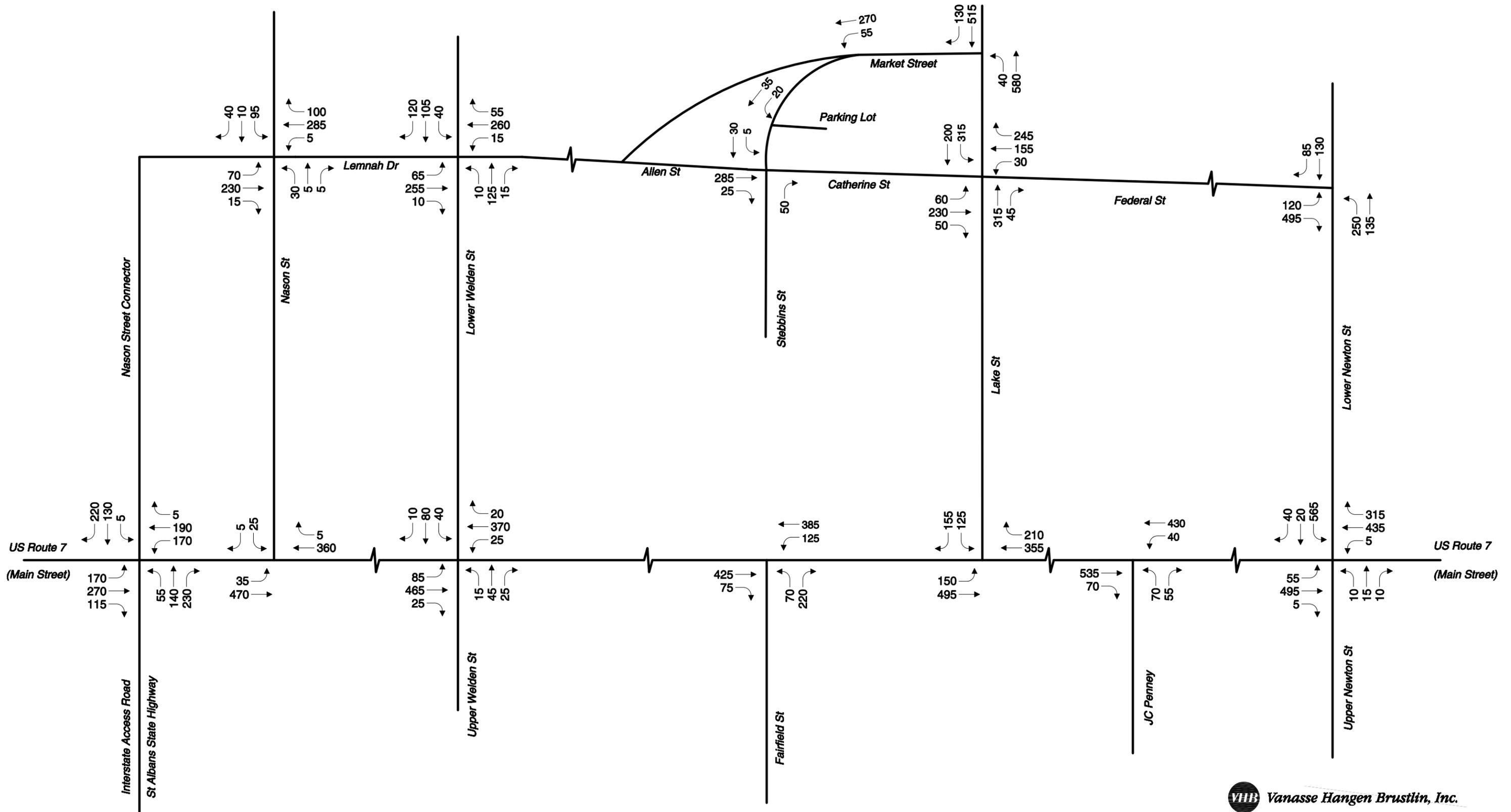


Figure 8  
 2010 Weekday Peak Hour Volumes  
 Proposed Action PM Peak Hour  
 Federal Street Corridor



Not to Scale

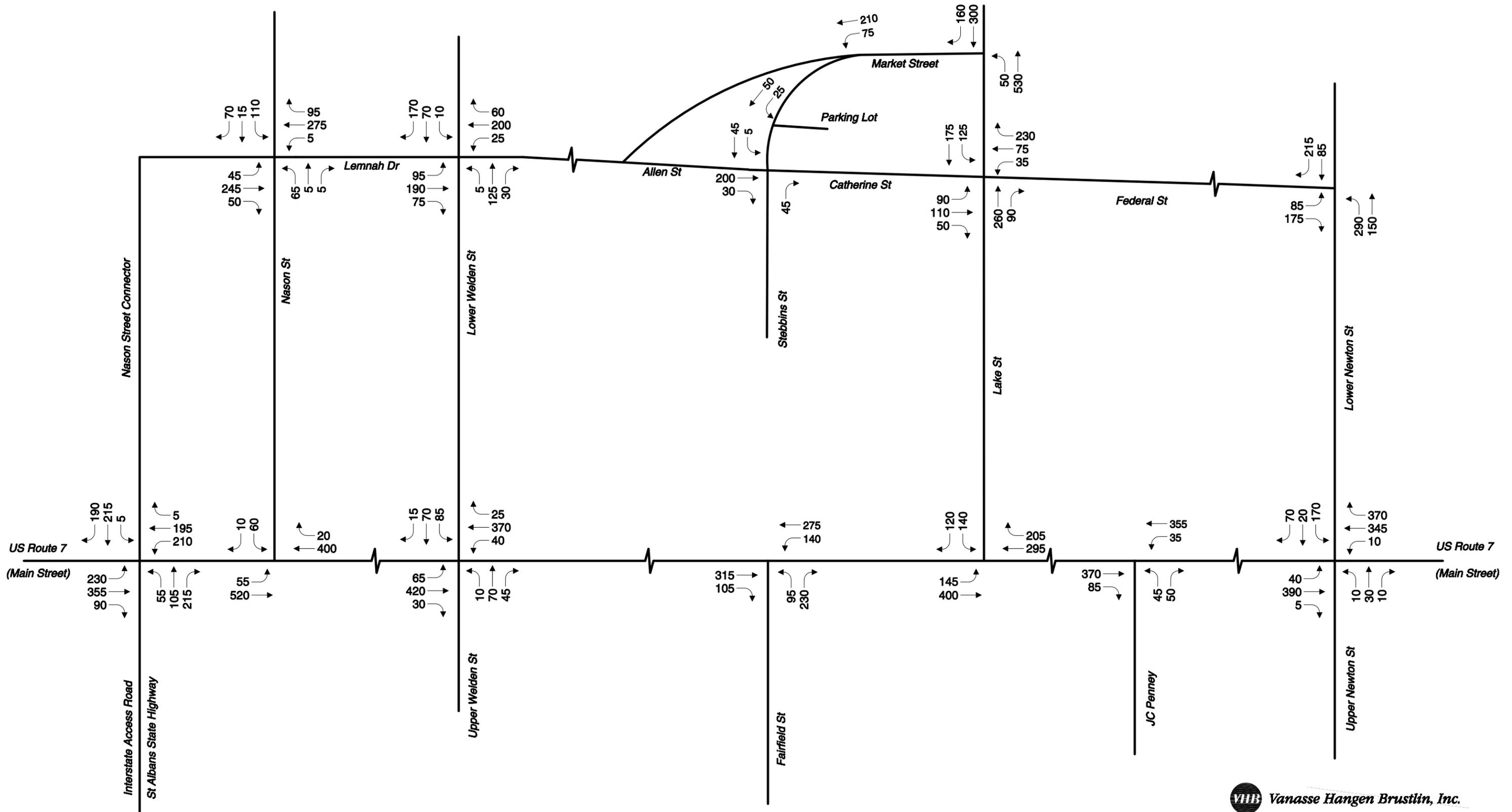


Figure 9  
 2030 Weekday Peak Hour Volumes  
 Proposed Action AM Peak Hour  
 Federal Street Corridor



Not to Scale

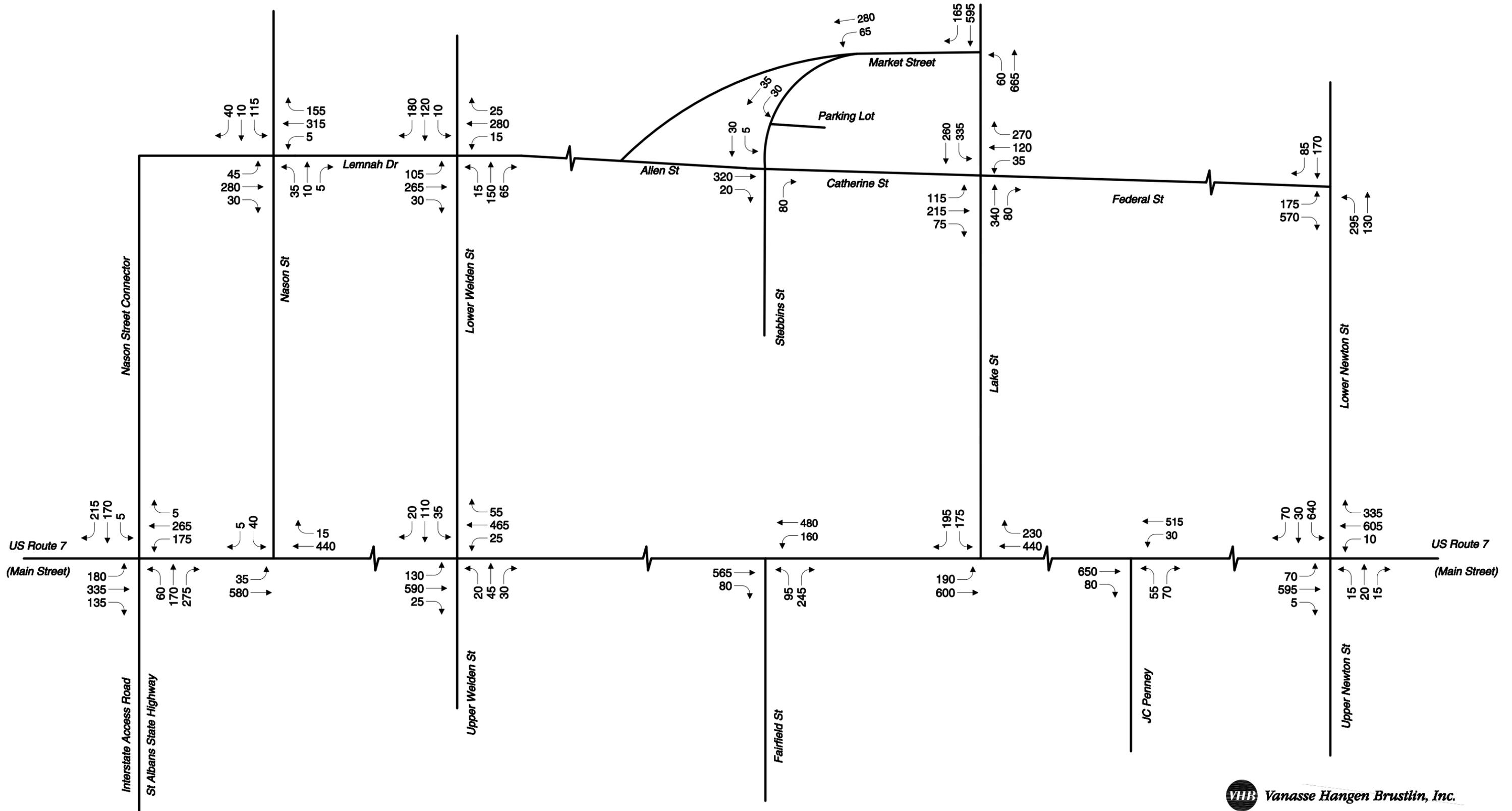


Figure 10  
 2030 Weekday Peak Hour Volumes  
 Proposed Action PM Peak Hour  
 Federal Street Corridor



Not to Scale